Historic, Archive Document

Do not assume content reflects current
scientific knowledge, policies, or practices.

aTD224
.W2W37

ed States
artment of
culture

Soil
Conservation
Service

Washington Basin Outlook Report June 1, 1993

Basin Outlook Reports
and
Federal - State - Private
Cooperative Snow Surveys

For more water supply and resource management information, contact:

LOCAL SOIL CONSERVATION SERVICE FIELD OFFICE or William Weller
Water Supply Specialist
Soil Conservation Service
W. 316 Boone Ave.; Suite 450
Spokane, WA 99201-2348
(509) 353-2341

How forecasts are made

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts. Streamflow forecasts are coordinated by Soil Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data are obtained by using a combination of manual and automated SNOTEL measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via meteor burst telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

Forecast uncertainty originates from two sources: (1) uncertainty of future hydrologic and climatic conditions, and (2) error in the forecasting procedure. To express the uncertainty in the most probable forecast, four additional forecasts are provided. The actual streamflow can be expected to exceed the most probable forecast 50% of the time. Similarly, the actual streamflow volume can be expected to exceed the 90% forecast volume 90% of the time. The same is true for the 70%, 30%, and 10% forecasts. Generally, the 90% and 70% forecasts reflect drier than normal hydrologic and climatic conditions; the 30% and 10% forecasts reflect wetter than normal conditions. As the forecast season progresses, a greater portion of the future hydrologic and climatic uncertainty will become known and the additional forecasts will move closer to the most probable forecast.

All programs and services of the USDA Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Washington
Water Supply Outlook

June 1993

General Outlook

JUNE 1, 1993: Snow has melted from all but the highest areas of the state. Washington SNOTEL sites averaged 38% of normal snowpack on June 1, down from 87% on May 1 (by June 7, the statewide average was 36%). Many of the basins are showing no snow and the Lewis River at 45% is the highest in the state. Precipitation was 143% of normal statewide, and varied from 88% of average in the Colville-Pend Oreille Basin to 194% in the Walla Walla Basin. Year-to-date precipitation varies from 119% in the Walla Walla to 72% in the Wenatchee-Chelan Basin. Forecasts for 1993 runoff vary from 100% of average for the Mill Creek to 57% for the Pend Oreille River. May temperatures were above normal and varied from seven degrees above at Stampede Pass to four degrees above in the Walla Walla Basin. May streamflows varied from 204% of normal on the Lewis River to 95% on the Pend Oreille River. June 1 irrigation reservoir storage is generally poor throughout the state, with reservoirs in the Yakima Basin at 74% of average and 85% of capacity.

Snowpack

The above normal temperatures and precipitation in May speeded up the snowpack meltout, which is complete at elevations below 5500 feet. Snowpack along the east slopes of the Cascade Mountains includes the Yakima with 16% of normal, down from 77% last month, and the Wenatchee 42%, down from 69%. Snowpack in the Okanogan is at 24% of average down from 83%, and the Spokane Basin at 38%, down from 81%. The Walla Walla River Basin which had 114% of average on May 1 now has no snow at the reporting stations. The west slope basins include the Lewis River at 45% of normal, the Green River 0% and the Skagit River 32%. The June 1 SNOTEL reading showed the snowpack to be 38% of average. This year, only nine of the 38 SNOTEL sites still have snow. Maximum snow cover is at Paradise on Mount Rainier, with a water content of 39.4 inches. This site would normally have 61.8 inches of water content on June 1.

Precipitation

May precipitation reported from National Weather Service stations was 143% of average statewide. The year-to-date precipitation statewide is 85% and varied from 119% of normal in the Walla Walla Basin to 72% in the Wenatchee-Chelan Basin. May precipitation varied from 88% of average in the Colville-Pend Oreille Basin to 194% in the Walla Walla Basin. SNOTEL sites in Washington showed high elevation year-to-date precipitation values to be 82% of average. Maximum year-to-date precipitation was at the June Lake SNOTEL site near Mt. St. Helens, with 129.1 inches since October 1, 1992. Normal for this site is 140.7 inches.

Reservoir

Irrigation reservoir storage in Washington remains below average for June 1. Reservoir storage in the Yakima Basin was 791,600 acre feet, 74% of normal. The Okanogan reservoirs are at 98% of normal for June 1, and 93% of capacity. The power generation reservoirs contain the following: Coeur d'Alene Lake, 227,500 acre feet, or 95% of normal; Chelan Lake, 615,800 acre feet, 137% of average and 91% of capacity, and Ross Lake at 111% of average, and 82% of capacity. Storage at Lake Roosevelt is at 158% of average.

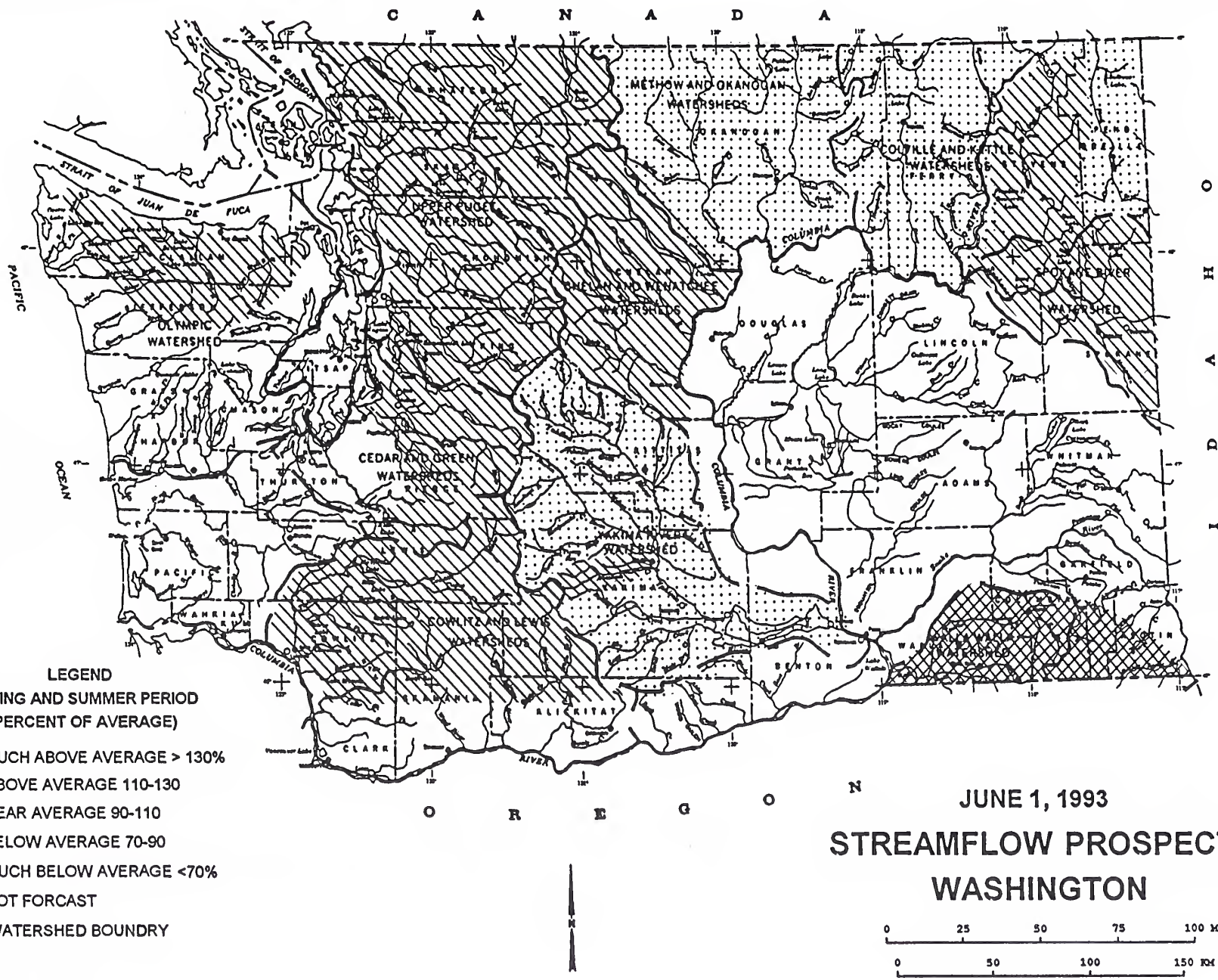
Streamflow

Forecasts for summer streamflow are for much below-to-near average and vary from 100% of average for Mill Creek to 57% of normal for the Pend Oreille River. June forecasts for some west side streams include: Skagit River, 73%; Lewis River, 79%; and the Elwah River, 74%. Some eastside streams include the Naches River at Naches, 62%; the Stemilt, 80%; the Spokane River, 89% and the Colville River, 90%. May streamflows varied throughout Washington. The Lewis River at 204% was the highest and the Pend Oreille River with 95%, was the lowest in the state. Other streamflows were the following percentage of normal: the Skagit River, 128%; the Wenatchee River, 119%; the Spokane River, 102%; the Columbia at the Canadian Border, 115%, and the Yakima River at Parker, 98%.

For more information contact your local Soil Conservation Service office.

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



LEGEND

SPRING AND SUMMER PERIOD

(PERCENT OF AVERAGE)

- MUCH ABOVE AVERAGE > 130%
- ABOVE AVERAGE 110-130
- NEAR AVERAGE 90-110
- BELOW AVERAGE 70-90
- MUCH BELOW AVERAGE <70%
- NOT FORCAST
- WATERSHED BOUNDRY

JUNE 1, 1993

STREAMFLOW PROSPECTS WASHINGTON

0 25 50 75 100 MI

0 50 100 150 KM

SOURCE: Data compiled by SCS Field Personnel.

JANUARY 1986 4-R-39641

BASE 4-R-39260

BASIN SUMMARY OF SNOW COURSE DATA

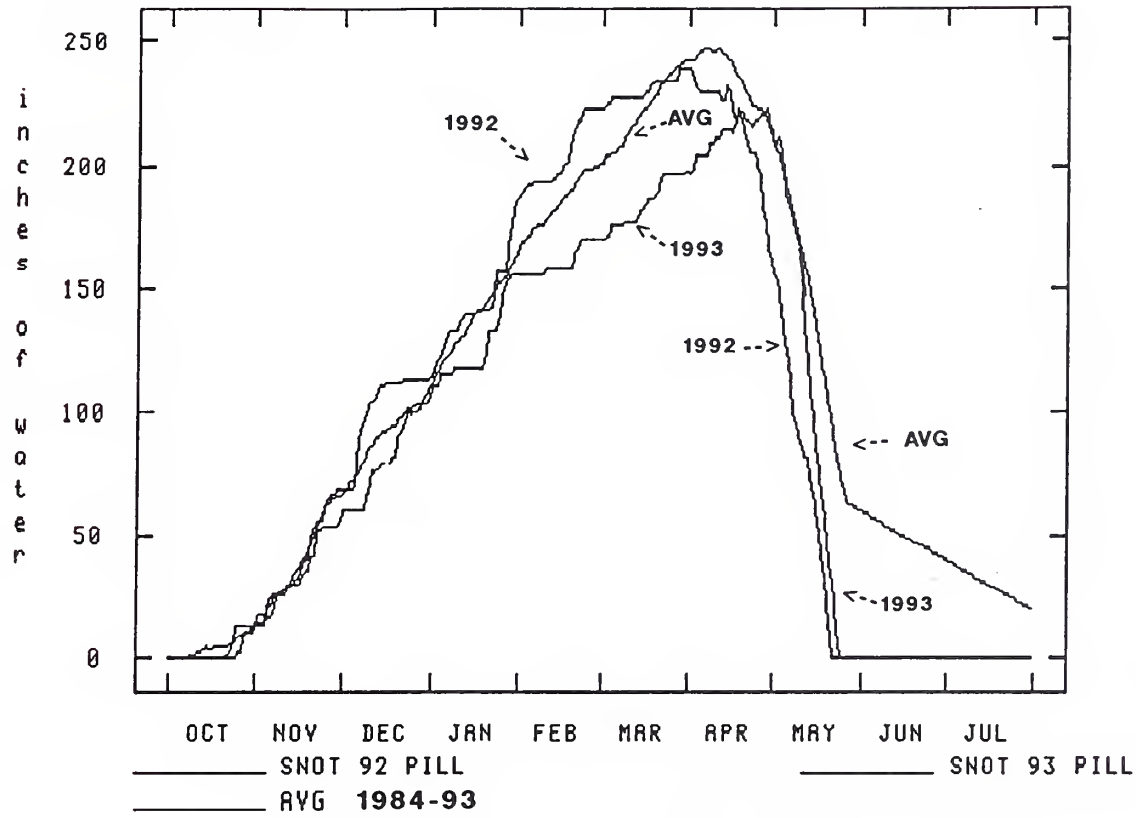
JUNE 1993

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-90
PEND OREILLE RIVER						
BUNCHGRASS MDWPILLOW	5000	6/01/93	---	.0	.0	15.4
HOODOO BASIN	6050	6/01/93	---	13.8E	14.0	32.9
HOODOO CREEK	5900	6/01/93	---	10.8E	10.3	31.9
LOOKOUT (d)	5140	6/01/93	---	.0	--	10.9
KETTLE RIVER						
BIG WHITE MTN CAN.	5510	5/31/93	0	.0	.0	8.9
FARRON CAN.	4000	5/31/93	0	.0	.0	.3
2E04 C is NOT a sitename on file.						
COLVILLE RIVER						
OMAK LAKE, TWIN LAKES						
SPOKANE RIVER						
LOOKOUT (d)	5140	6/01/93	---	.0	--	10.9
LOST LAKE (d)	6110	6/01/93	---	20.2E	5.1	41.6
MOSQUITO RDG PILLOW	5200	6/01/93	---	.0	.0	16.0
SUNSET PILLOW	5540	6/01/93	---	4.9	.0	20.7
NEWMAN LAKE						
QUARTZ PEAK PILLOW	4700	6/01/93	---	.0	.0	.0
OKANOGAN RIVER						
BLACKWALL PEAK CAN.	6370	6/01/93	---	.0	.0	26.2
ENDERBY CAN.	6200	5/31/93	43	16.3	15.4	39.0
FREEZEOUT CK. TRAIL	3500	5/30/93	0	.0	.0	--
GREYBACK RES CAN.	5120	5/25/93	0	.0	--	.8
HARTS PASS	6500	5/29/93	29	15.6	--	--
HARTS PASS PILLOW	6500	6/01/93	---	5.5S	1.6	25.3
ISINTOK LAKE CAN.	5500	5/27/93	0	.0	--	1.2
MISSION CREEK CAN.	5800	5/31/93	6	2.4	--	13.6
MT. KOBAU CAN.	5900	5/27/93	0	.0	.0	5.0
SALMON MDWS PILLOW	4500	6/01/93	---	.0S	.0	.0
SILVER STAR MTN CAN.	6000	5/30/93	17	8.8	3.6	16.9
SUMMERLAND RES CAN.	4200	5/27/93	0	.0	--	.4
WHITE ROCKS MTN CAN.	6000	5/31/93	0	.0	--	9.3
METHOW RIVER						
HARTS PASS	6500	5/29/93	29	15.6	--	--
HARTS PASS PILLOW	6500	6/01/93	---	5.5S	1.6	25.3
SALMON MDWS PILLOW	4500	6/01/93	---	.0S	.0	.0
CHELAN LAKE BASIN						
LYMAN LAKE PILLOW	5900	6/01/93	---	22.8S	23.6	43.3
MINERS RIDGE PILLOW	6200	6/01/93	---	14.6S	9.3	--
PARK CK RIDGE PILLOW	4600	6/01/93	---	.0E	.0	5.2
RAINY PASS	4780	5/30/93	0	.0	13.5	--
RAINY PASS PILLOW	4780	6/01/93	---	.0S	5.5	20.4
ENTIAT RIVER						
POPE RIDGE PILLOW	3540	6/01/93	---	.0S	.0	.0
WENATCHEE RIVER						
BLEWETT PASS#2PILLOW	4270	6/01/93	---	.0S	.0	.0
FISH LAKE PILLOW	3370	6/01/93	---	.0S	.0	5.0
LYMAN LAKE PILLOW	5900	6/01/93	---	22.8S	23.6	43.3
STEVENS PASS PILLOW	4070	6/01/93	---	.0S	.0	5.7
TROUGH #2 PILLOW	5310	6/01/93	---	.0S	.0	.0
UPPER WHEELER PILLOW	4400	6/01/93	---	.0S	.0	.0
SQUILCHUCK CREEK						
STEMILT CREEK						
UPPER WHEELER PILLOW	4400	6/01/93	---	.0S	.0	.0
COLOCKUM CREEK						
TROUGH #2 PILLOW	5310	6/01/93	---	.0S	.0	.0
YAKIMA RIVER						
BLEWETT PASS#2PILLOW	4270	6/01/93	---	.0S	.0	.0
BUMPING RIDGE PILLOW	4600	6/01/93	---	.0E	.0	6.3
CORRAL PASS PILLOW	6000	6/01/93	---	11.7S	1.5	19.6
FISH LAKE PILLOW	3370	6/01/93	---	.0S	.0	5.0
GREEN LAKE PILLOW	6000	6/01/93	---	.0S	.0	3.8
GROUSE CAMP PILLOW	5380	6/01/93	---	.0S	.0	.0
MORSE LAKE PILLOW	5400	6/01/93	---	5.1E	.0	21.4
OLALLIE MDWS PILLOW	3960	6/01/93	---	.0S	.0	30.0
SASSE RIDGE PILLOW	4200	6/01/93	---	.0S	.0	1.3
STAMPEDE PASS PILLOW	3860	6/01/93	---	.0S	.0	15.0
WHITE PASS ES PILLOW	4500	6/01/93	---	.0S	.0	4.6
AHTANUM CREEK						
GREEN LAKE PILLOW	6000	6/01/93	---	.0S	.0	3.8
MILL CREEK						
HIGH RIDGE PILLOW	4980	6/01/93	---	.0S	.0	.6
TOUCHET #2 PILLOW	5530	6/01/93	---	.0	.0	--
LEWIS - COWLITZ RIVERS						
JUNE LAKE PILLOW	3200	6/01/93	---	.0S	.0	.0
LONE PINE PILLOW	3800	6/01/93	---	8.5S	.0	9.4
PARADISE PARK PILLOW	5500	6/01/93	---	39.4S	18.0	48.1
PIGTAIL PEAK PILLOW	5900	6/01/93	---	2.0S	5.9	37.5
POTATO HILL PILLOW	4500	6/01/93	---	.0S	.0	1.1
SHEEP CANYON PILLOW	4050	6/01/93	---	.0E	.0	11.6
SPENCER MDW PILLOW	3400	6/01/93	---	.0S	.0	.0
SPIRIT LAKE PILLOW	3100	6/01/93	---	.0S	.0	.0
SURPRISE LKS PILLOW	4250	6/01/93	---	2.3S	.0	14.5
WHITE PASS ES PILLOW	4500	6/01/93	---	.0S	.0	4.6
WHITE RIVER						
CORRAL PASS PILLOW	6000	6/01/93	---	11.7S	1.5	19.6
MORSE LAKE PILLOW	5400	6/01/93	---	5.1E	.0	21.4
GREEN RIVER						
COUGAR MTN. PILLOW	3200	6/01/93	---	.0S	.0	.0
STAMPEDE PASS PILLOW	3860	6/01/93	---	.0S	.0	15.0
CEDAR RIVER						
SNOQUALMIE RIVER						
OLALLIE MDWS PILLOW	3960	6/01/93	---	.0S	.0	30.0
SKYKOMISH RIVER						
STAMPEDE PASS PILLOW	3860	6/01/93	---	.0S	.0	15.0
STEVENS PASS PILLOW	4070	6/01/93	---	.0S	.0	5.7
SKAGIT RIVER						
BEAVER CREEK TRAIL	2200	5/29/93	0	.0	.0	--
BEAVER PASS	3680	5/29/93	0	.0	.0	--
BROWN TOP AM	6000	5/29/93	30	16.0	22.6	--
DEVILS PARK	5900	5/29/93	9	4.6	15.8	31.8
FREEZEOUT CK. TRAIL	3500	5/30/93	0	.0	.0	--
HARTS PASS	6500	5/29/93	29	15.6	--	--
HARTS PASS PILLOW	6500	6/01/93	---	5.5S	1.6	25.3
LYMAN LAKE PILLOW	5900	6/01/93	---	22.8S	23.6	43.3
MEADOWS CABIN	1900	5/29/93	0	.0	.0	--
NEW HOZOMEEN LAKE	2800	5/30/93	0	.0	.0	--
RAINY PASS	4780	5/30/93	0	.0	13.5	--
RAINY PASS PILLOW	4780	6/01/93	---	.0S	5.5	20.4
THUNDER BASIN	4200	5/29/93	0	.0	.0	10.0
BAKER RIVER						
ELWHA RIVER						
MORSE CREEK						
DUNGENESS RIVER						
QUILCENE RIVER						
MOUNT CRAG PILLOW	4050	6/01/93	---	.0S	.0	--
WYNOOCHEE RIVER						

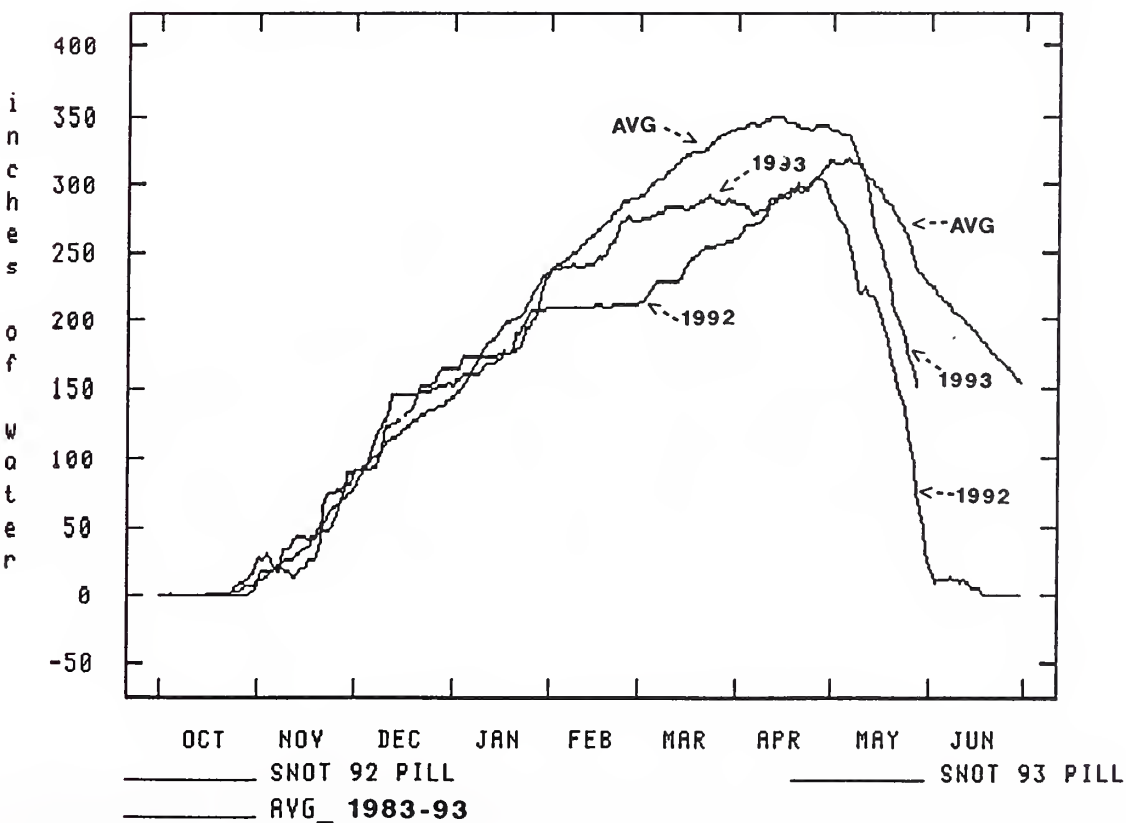
(d) Denotes discontinued site.

Accumulated Snowpack At Selected SNOTEL Stations
Washington State

Station : 17A01S, BUNCHGRASS MDW

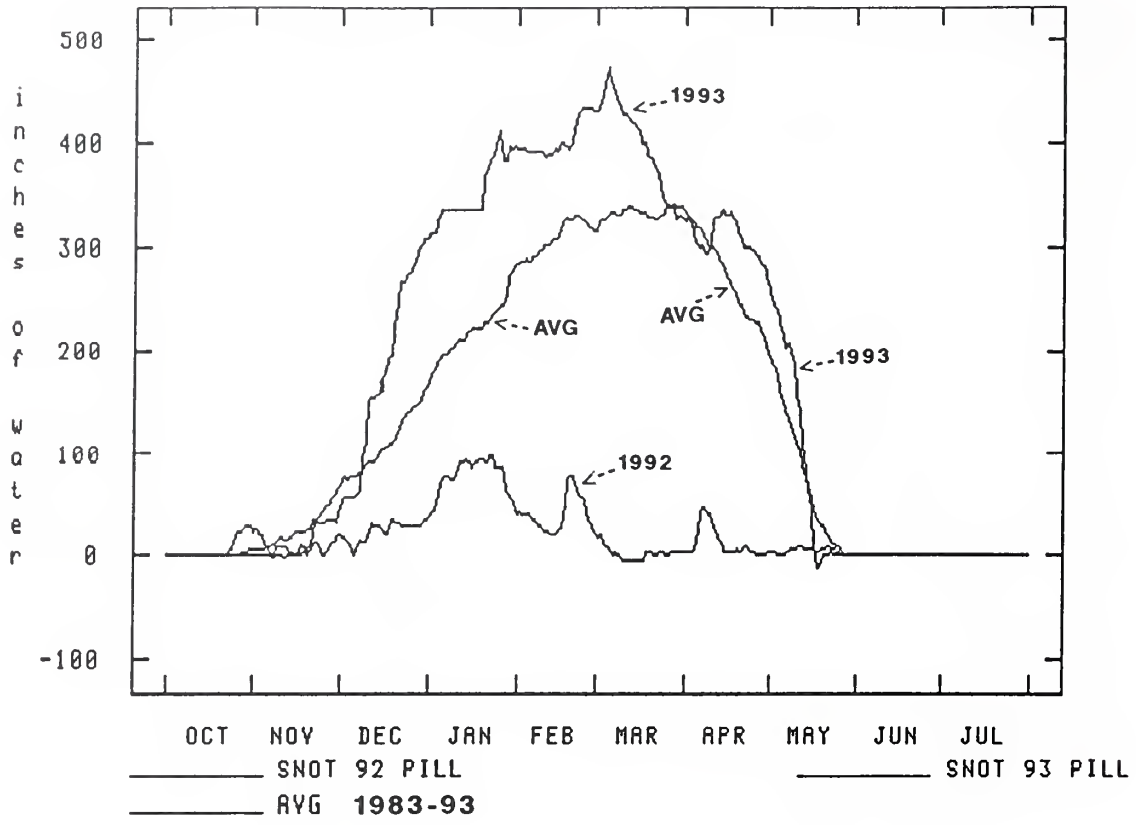


Station : 21B13S, CORRAL PASS

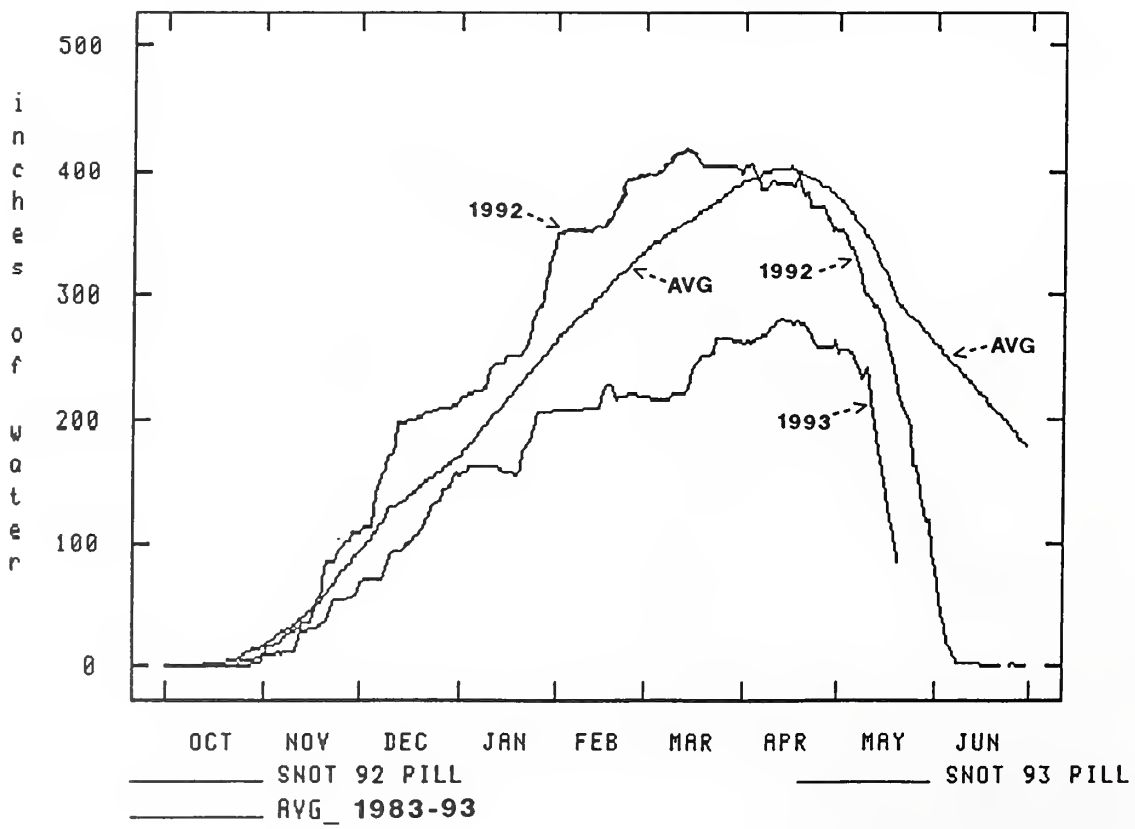


Accumulated Snowpack At Selected SNOTEL Stations
Washington State

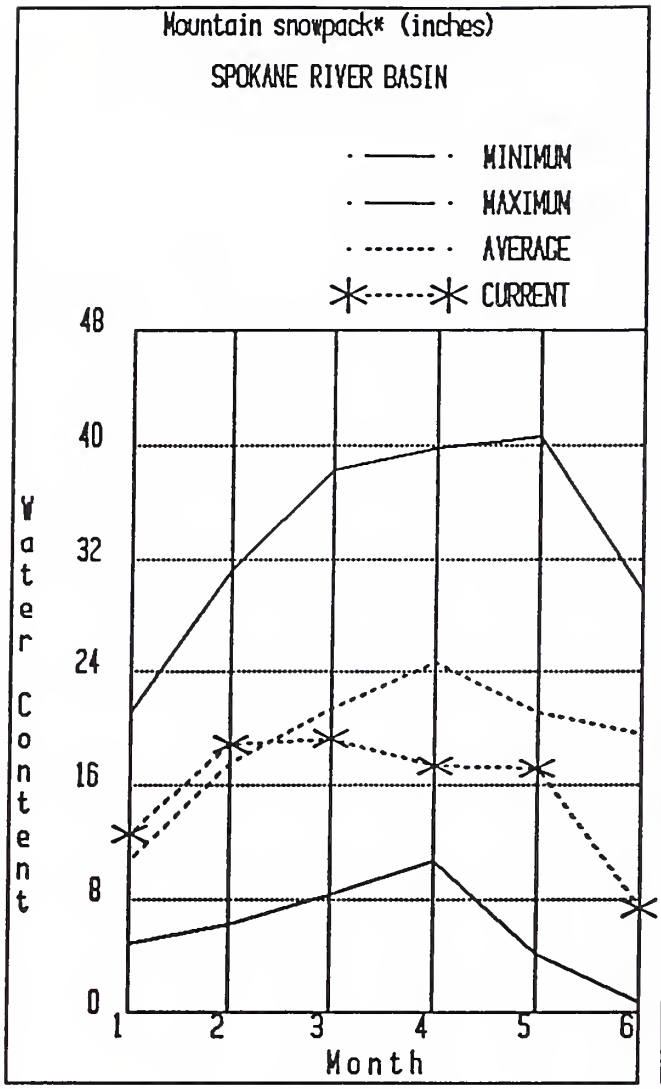
Station : 22C09S, JUNE LAKE

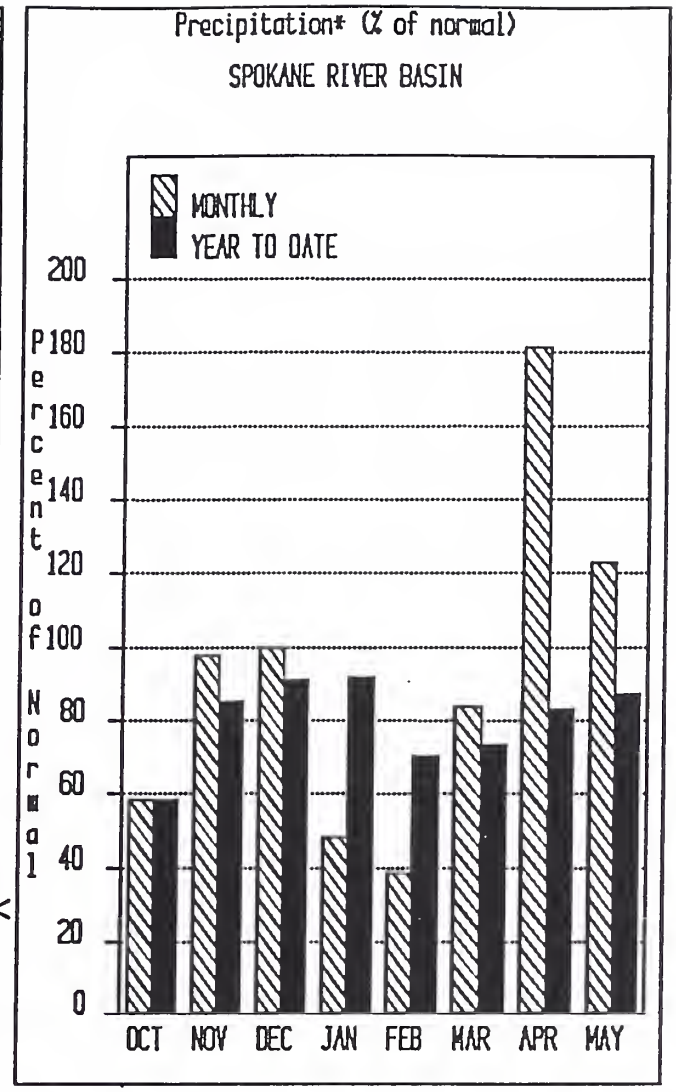


Station : 20A09S, RAINY PASS



Spokane River Basin





*Based on selected stations

Streamflow on the Spokane River was 102% of average for May. Precipitation for May was 95% of average, at Spokane. The June 1 forecasts for summer runoff within the Spokane River Basin are 89%, up from 83% of normal last month. The forecast is based on a snowpack that is 38% of average and a water year-to-date precipitation value of 95% of normal. Temperatures in the basin were six degree above normal during May. June 1 storage in Coeur d'Alene Lake is 227,500 acre feet, 81% of normal, and 95% of capacity.

For more information contact your local Soil Conservation Service office.

SPOKANE RIVER BASIN
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------- Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	50% (Most Probable) (% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
SPOKANE at Long Lake (2)	JUN-JUL	540	675	765	89	855	990	861

SPOKANE RIVER BASIN
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg
COEUR D'ALENE	238.5	227.5	283.2	280.5

SPOKANE RIVER BASIN
Watershed Snowpack Analysis - June 1, 1993

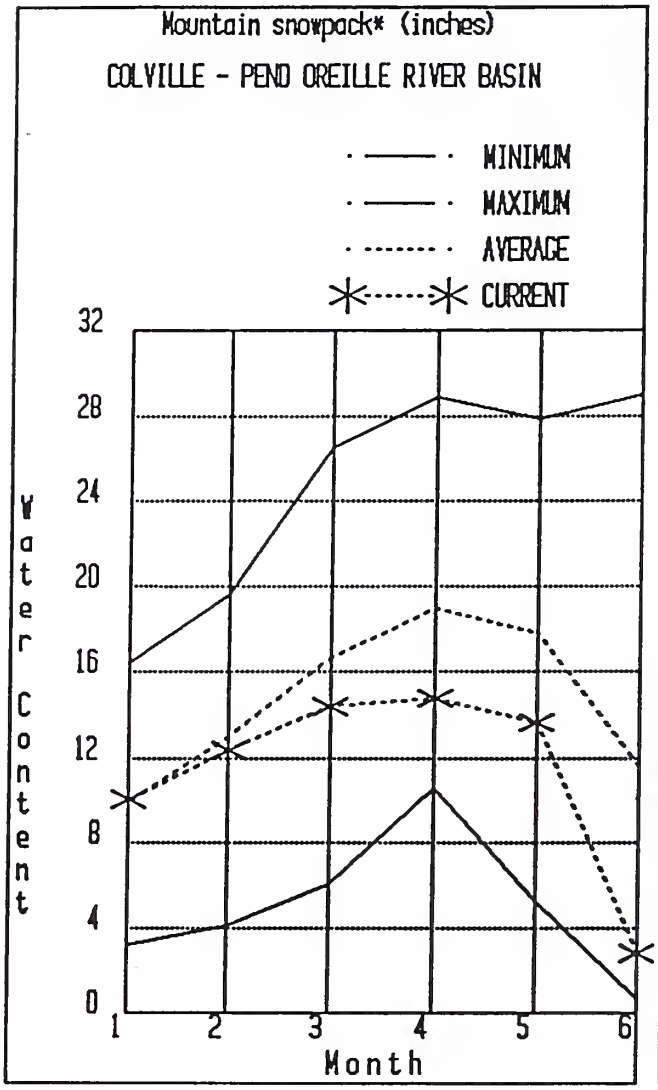
Watershed	Number of Data Sites	This Year as % of Last Yr	This Year as % of Average
Spokane River	3	396	49

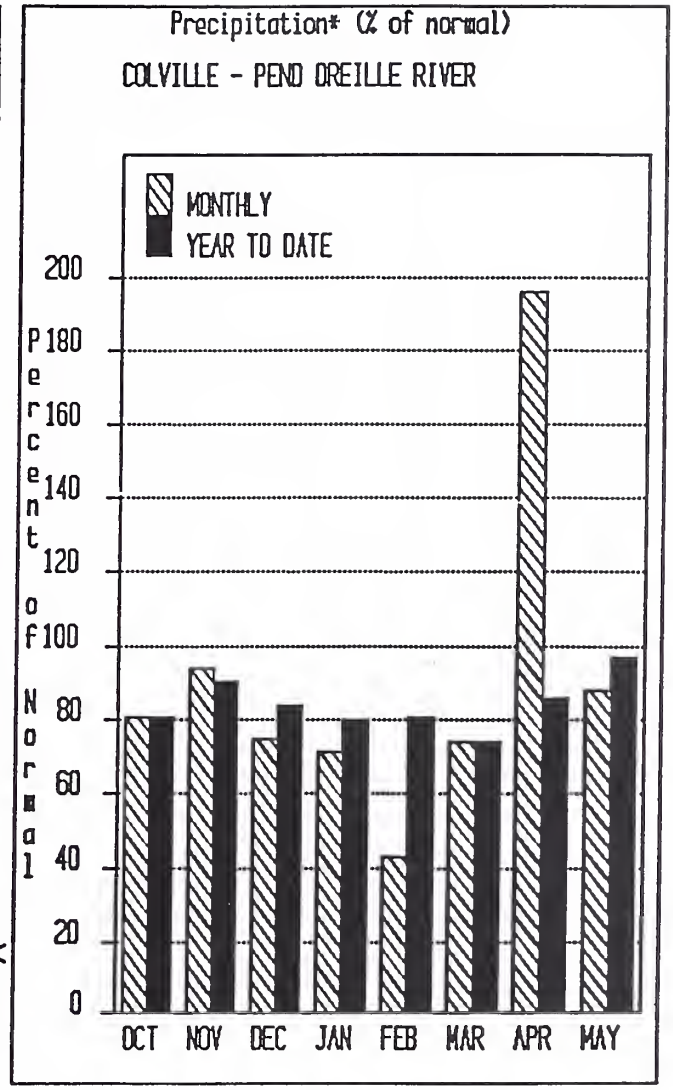
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Colville - Pend Oreille River Basins





*Based on selected stations

June 1 snow cover is 27% of normal, down from 76% of average on the Pend Oreille, and no snow on the Colville River and the Kettle River. Precipitation during May was 88% of average, bringing the water year-to-date to 97% of normal. Temperatures were seven degree above normal for May. The forecast for the Kettle River streamflow is 61% of normal, the Pend Oreille, 57%, and the Colville River, 90% of normal for the summer runoff period. May streamflow was 95% of normal on the Pend Oreille River, 115% on the Columbia at the International Boundary, and 128% on the Kettle River. Snowpack at Bunchgrass Meadow SNOTEL site was melted out on May 26, the average June 1 reading is 16.2 inches.

For more information contact your local Soil Conservation Service office.

COLVILLE - PEND OREILLE RIVER BASINS
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------- Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
PEND OREILLE bl Box Canyon (1,2)	JUN-SEP	1730	3580	4420	57	5260	7110	7754
	JUN-JUL	1090	2770	3530	54	4290	5970	6543
CHAMOKANE CK nr Long Lake	MAY-AUG	3.2	6.0	8.0	85	10.0	12.8	9.4
	JUL-AUG	2.4	2.7	2.8	85	2.9	3.2	3.3
COLVILLE at Kettle Falls	JUN-SEP	24	32	37	90	42	50	41
	JUN-JUL	16.0	23	27	90	31	38	30
KETTLE nr Laurier	JUN-SEP	345	450	520	61	590	695	851
	JUN-JUL	330	425	485	64	550	640	758
COLUMBIA at Birchbank (1,2)	JUN-SEP	18400	21200	22420	71	23700	26400	31580
	JUN-JUL	12200	14400	15350	67	16300	18500	22910
COLUMBIA at Grand Coulee Dm (1,2)	JUN-SEP	23100	27000	28700	69	30400	34300	41650
	JUN-JUL	17000	20200	21600	69	23000	26200	31370

COLVILLE - PEND OREILLE RIVER BASINS
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg
ROOSEVELT	5232.0	9150.7	3440.5	2851.0
BANKS		NO REPORT		

COLVILLE - PEND OREILLE RIVER BASINS
Watershed Snowpack Analysis - June 1, 1993

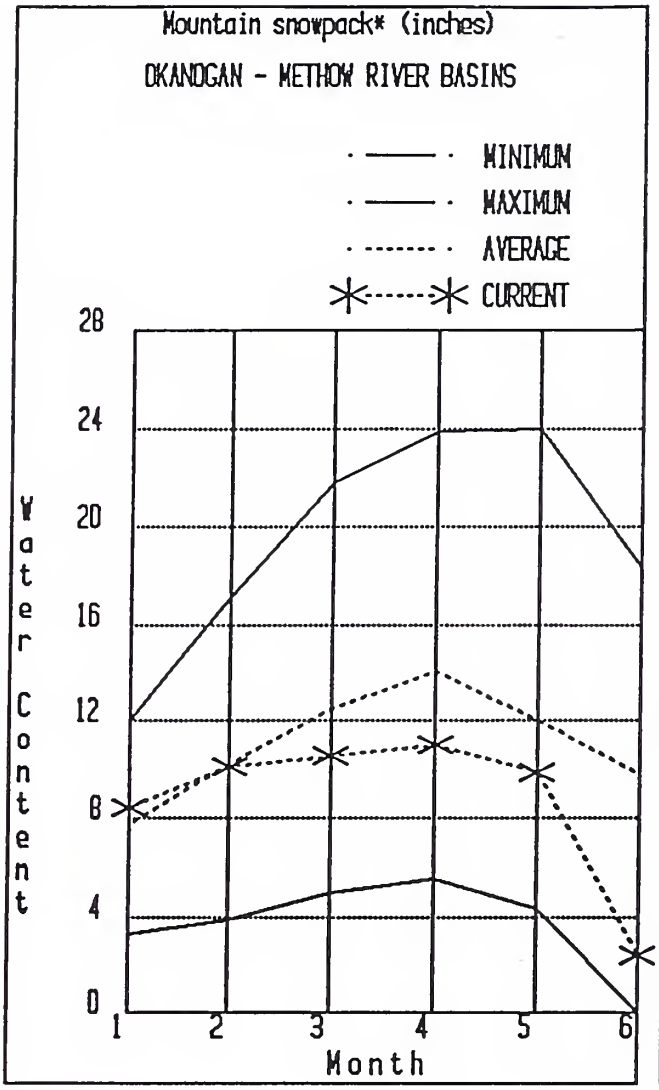
Watershed	Number of Data Sites	This Year as % of Last Yr	Average
Colville River	0	0	0
Pend Oreille River	3	101	31
Kettle River	2	0	0

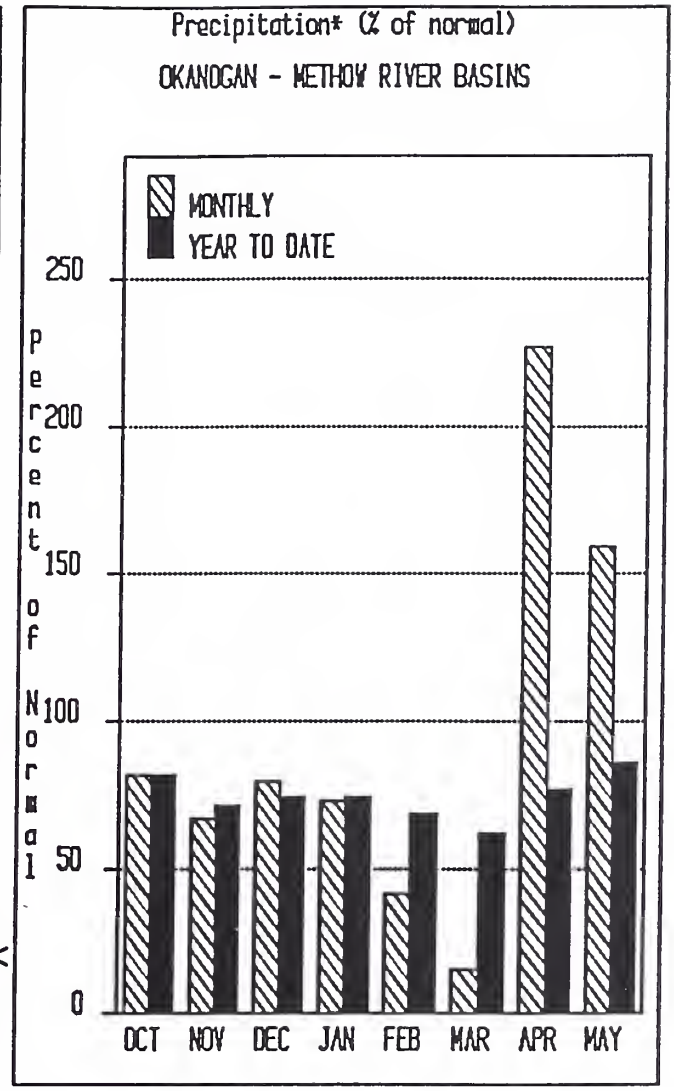
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Okanogan - Methow River Basins





*Based on selected stations

Summer runoff forecast for the Okanogan River is 70% of normal; the Similkameen River, 63% and the Methow River, 65% of normal. Storage in the Conconully Reservoir is 17,600 acre feet, which is 75% of capacity and 98% of June 1 average. June 1 snow cover on the Okanogan was 24% of normal, down from 83% of average, 22% on the Methow. May precipitation in the Okanogan-Methow was 159% of normal, with water year-to-date at 86% of average. May streamflow on the Methow River was 105% of normal, 108% on the Okanogan River, and 103% on the Similkameen. Snow water content at the Harts Pass SNOTEL, elevation 6500 feet, was 5.5 inches; normal for this site is 25.3 inches. Temperatures were six degrees above normal for the month.

For more information contact your local Soil Conservation Service office.

OKANOGAN - METHOW RIVER BASINS
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------ Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	50% (Most Probable) (% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
SIMILKAMEEN nr Nighthawk (1)	MAY-SEP	650	765	820	63	875	990	1300
	MAY-JUL	600	715	770	64	825	940	1205
	MAY-JUN	545	620	650	64	680	755	1014
OKANOGAN RIVER nr Tonasket (1)	MAY-SEP	550	885	1040	70	1190	1530	1485
	MAY-JUL	515	810	945	71	1080	1380	1328
	MAY-JUN	445	685	790	72	895	1130	1095
METHOW RIVER nr Pateros (1)	MAY-SEP	380	500	555	65	610	730	854
	MAY-JUL	340	460	510	65	560	680	786
	MAY-JUN	270	380	430	65	480	590	659

OKANOGAN - METHOW RIVER BASINS
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg
CONCONULLY LAKE (SALMON)	10.5	8.9	8.2	9.0
CONCONULLY RESERVOIR	13.0	8.7	6.9	9.0

OKANOGAN - METHOW RIVER BASINS
Watershed Snowpack Analysis - June 1, 1993

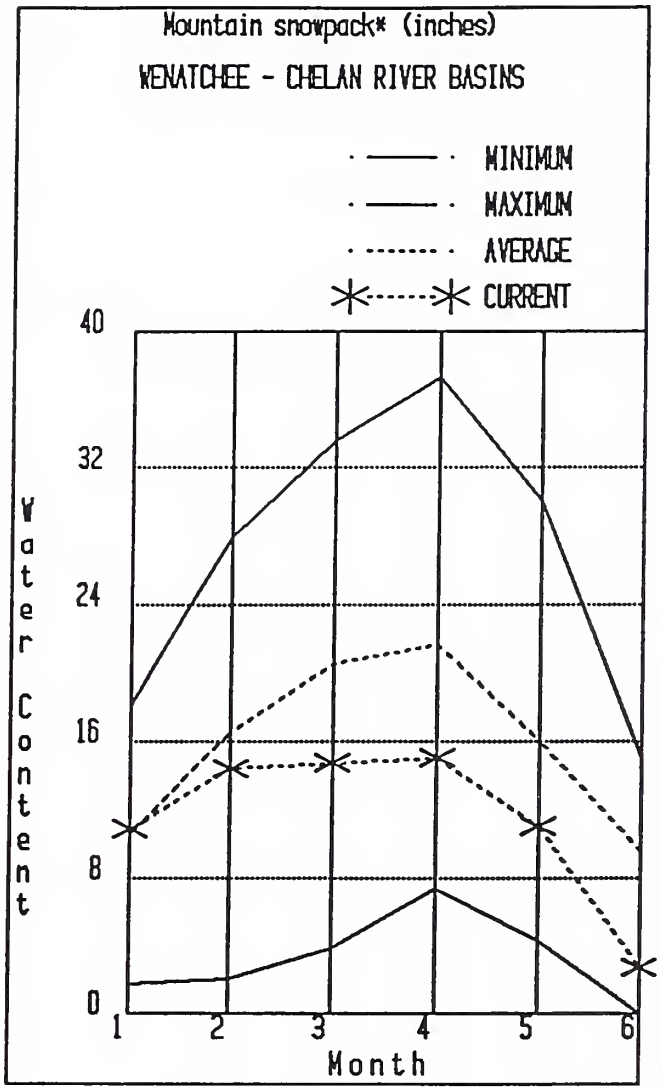
Watershed	Number of Data Sites	This Year as % of Last Yr	This Year as % of Average
Okanogan River	6	149	27
Methow River	2	344	22

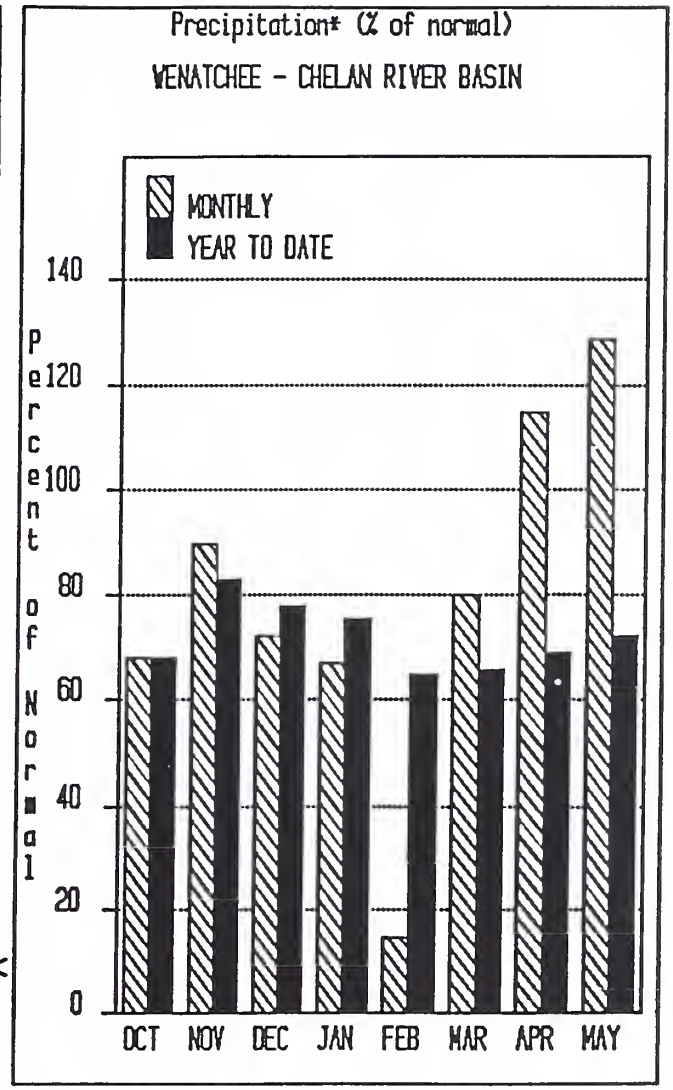
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Wenatchee - Chelan River Basins





*Based on selected stations

June 1 snowpack in the Wenatchee Basin is 42% of average; down from 67% and the Chelan Basin is 33%. Precipitation during May was 129% of normal in the basin and 72% for the year to date. The summer forecast for the Chelan River is for 79% of normal, for the Wenatchee River, it is 77%, and 80% on the Squilchuck-Stemilt. Runoff for the Entiat River is forecast to be 75% of normal for the summer. Reservoir storage in Lake Chelan is 615,800 acre feet, or 137% of June 1 average and 91% of capacity. Lyman Lake SNOTEL had the most snow water with 22.8 inches of water; this site would normally have 43.3 inches. Streamflow for May on the Chelan River was 135% of average and on the Wenatchee River it was 119% of normal.

For more information contact your local Soil Conservation Service office.

WENATCHEE - CHELAN RIVER BASINS
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------- Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
CHELAN RIVER at Chelan (1)	MAY-SEP	620	760	825	79	890	1030	1041
	MAY-JUL	540	665	720	80	775	900	905
	MAY-JUN	420	510	555	80	600	690	693
STEHEKIN R. at Stehekin	MAY-SEP	515	560	590	79	620	665	751
	MAY-JUL	435	475	500	80	525	565	625
	MAY-JUN	330	355	375	81	395	420	462
ENTIAT RIVER nr Ardenvoir	MAY-SEP	123	142	155	75	168	187	208
	MAY-JUL	111	128	140	74	152	169	188
	MAY-JUN	90	104	113	75	122	136	150
WENATCHFE R. at Peshastin	MAY-SEP	610	905	1100	77	1300	1590	1428
	MAY-JUL	565	825	1000	78	1180	1430	1277
	MAY-JUN	445	645	780	78	915	1120	997
STEMILT nr Wenatchee (miners in)	MAY-SEP	65	92	110	80	128	155	138
ICICLE CREEK nr Leavenworth	APR-SEP	174	245	295	80	345	415	370
	APR-JUL	159	225	270	79	315	380	340
	APR-JUN	129	181	217	80	255	305	270

WENATCHEE - CHELAN RIVER BASINS
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg
CHELAN LAKE	676.1	615.8	464.3	450.6

WENATCHEE - CHELAN RIVER BASINS
Watershed Snowpack Analysis - June 1, 1993

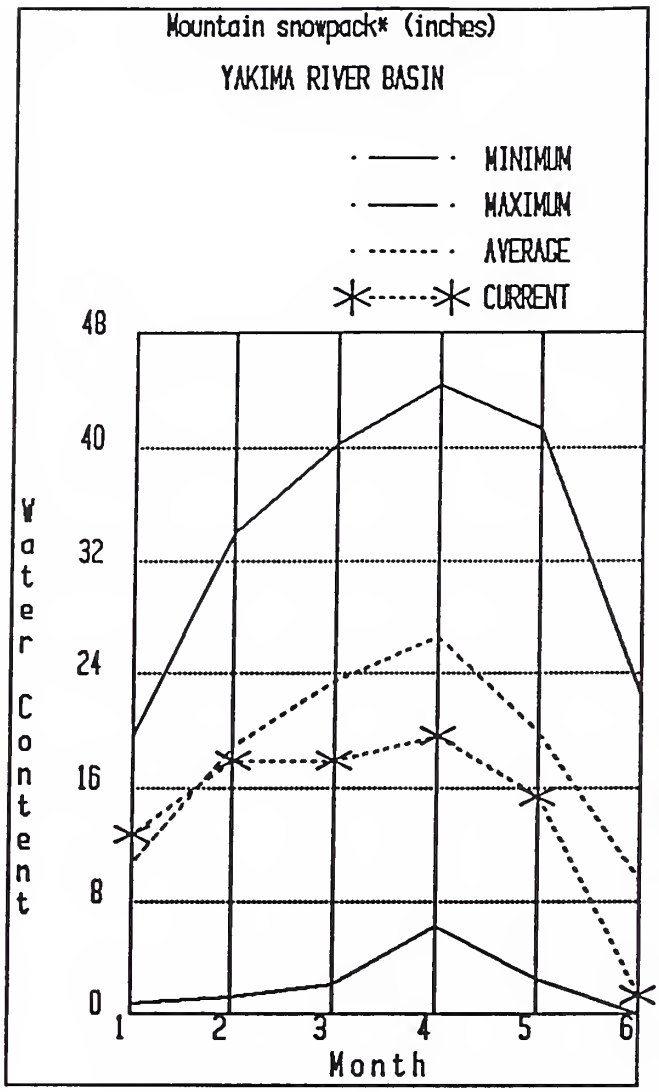
Watershed	Number of Data Sites	This Year as % of Last Yr	Average
Chelan Lake Basin	3	78	33
Entiat River	1	0	0
Wenatchee River	6	97	42
Squilchuck Creek	0	0	0
Stemilt Creek	1	0	0
Colockum Creek	1	0	0

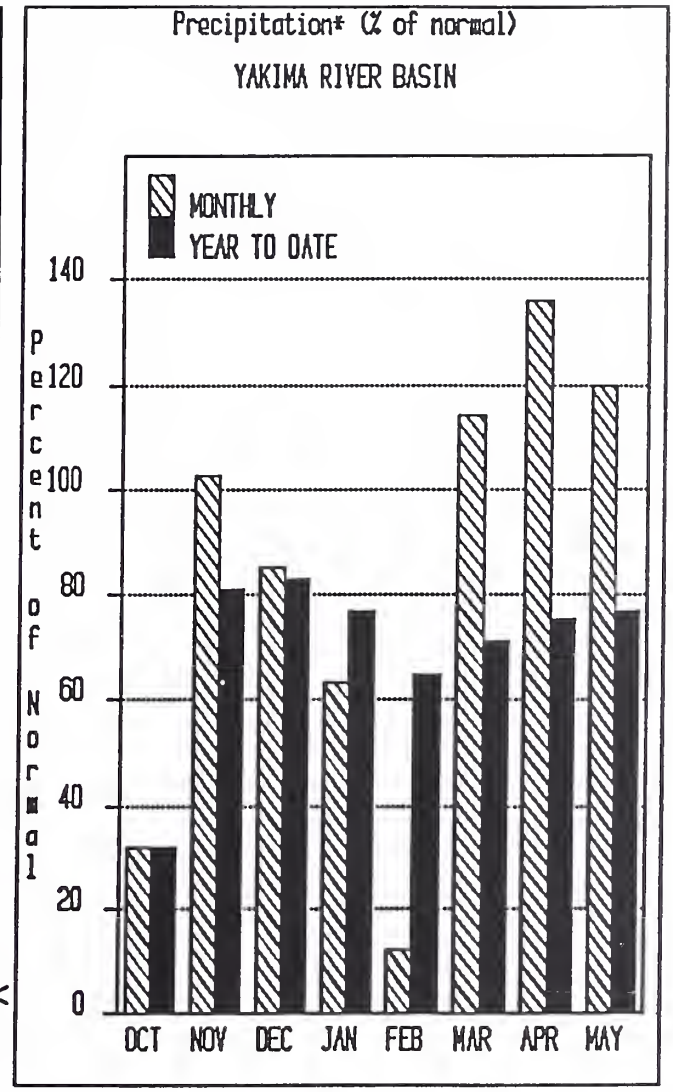
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Yakima River Basin





*Based on selected stations

June 1 summer streamflow forecasts for the Yakima Basin are for below to much below normal: The Yakima River at Cle Elum, 62%; Naches River, 62%; the Yakima River at Parker, 65%, Ahtanum Creek, 74%, and the Tieton River 63%. June 1 snowpack is 16% of average, down from 77% last month. May precipitation was 120% of normal and 77% for the water year to date. June 1 reservoir storage for the five major reservoirs at 791,600 acre feet, was 85% of average. May streamflows on the Yakima River at Parker were 98% of normal, 108% for the Yakima near Cle Elum, and 101% for the Naches River. Temperatures were five degrees above average for May at Yakima. The snowpack is based upon 11 snow courses and SNOTEL readings. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U. S. Bureau of Reclamation's forecast for the total water supply available which includes irrigation return flow.

For more information contact your local Soil Conservation Service office.

YAKIMA RIVER BASIN
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------ Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
LAKE KEECHELUS INFLOW	JUN-JUL	18.0	26	32	63	38	46	51
	JUN-SEP	22	32	39	63	46	56	62
KACHESS LAKE INFLOW	JUN-JUL	16.0	23	28	62	33	40	45
	JUN-SEP	18.0	27	32	62	38	46	52
CLE ELUM LAKE INFLOW	JUN-JUL	87	111	127	63	143	167	201
	JUN-SEP	102	130	150	63	170	199	239
YAKIMA RIVER at Cle Elum	JUN-JUN	102	134	156	62	178	210	251
	JUN-JUL	147	193	224	62	255	300	361
	JUN-SEP	187	240	275	62	310	365	444
BUMPING LAKE INFLOW	JUN-SEP	28	39	48	62	56	68	77
	JUN-JUL	23	33	40	62	48	58	65
AMERICAN RIVER nr Nile	JUN-SEP	31	37	41	63	45	52	66
	JUN-JUL	26	31	35	63	39	45	56
RIMROCK LAKE INFLOW	JUN-SEP	67	80	90	63	99	112	143
	JUN-JUL	51	60	67	63	73	82	106
NACHES RIVER nr Naches (2)	JUN-SEP	182	230	263	62	295	345	424
	JUN-JUL	145	187	215	62	245	285	347
AHTANUM CREEK nr Tampico (2)	MAY-SEP	20	25	28	74	31	37	38
	MAY-JUL	17.0	22	25	74	28	33	34
	MAY-JUN	15.0	18.0	21	75	24	27	28
YAKIMA near Parker	JUN-SEP	3.0	105	183	65	260	375	281
	JUN-JUL	325	425	490	65	555	655	749

YAKIMA RIVER BASIN
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg
KEECHELUS	157.8	140.4	105.5	144.0
KACHESS	239.0	133.1	221.1	218.0
CLE ELUM	436.9	327.6	383.3	378.0
BUMPING LAKE	33.7	30.8	35.4	27.0
RIMROCK	198.0	159.7	170.4	167.0

YAKIMA RIVER BASIN
Watershed Snowpack Analysis - June 1, 1993

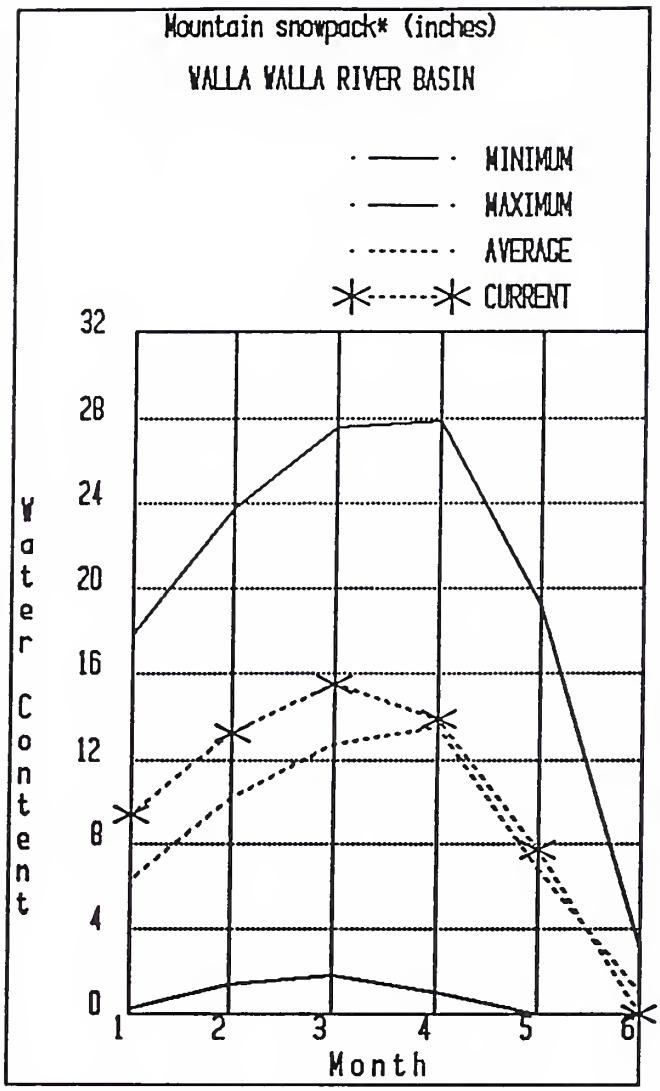
Watershed	Number of Data Sites	This Year as % of Last Yr	Average
Yakima River	11	1120	16
Ahtanum Creek	1	0	0

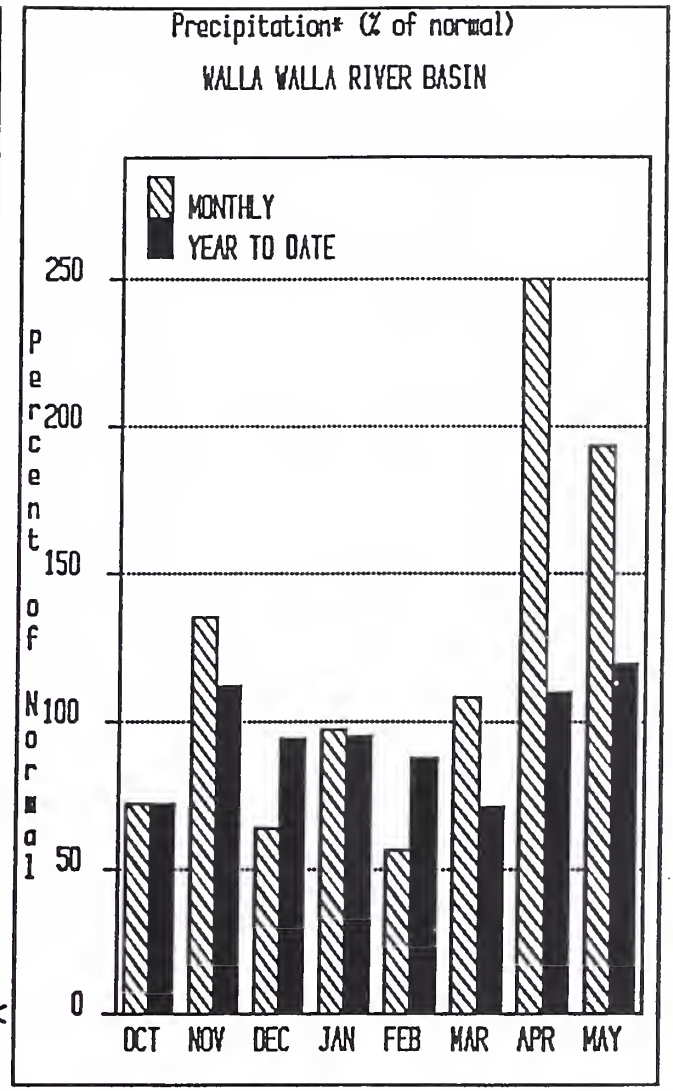
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Walla Walla River Basin





*Based on selected stations

May streamflow was 97% of normal on the Walla Walla River, 115% for the Snake River, and 150% on the Grande Ronde River near Troy. June 1 snowpack is gone from the measuring sites. The forecast is for 92% of average streamflow in the Walla Walla River for the coming summer, the Grande Ronde, 99%; Snake River, 70%, and 100% for Mill Creek. May precipitation was 194% of average, bringing the year-to-date precipitation to 119% of normal, the highest in the state. Temperatures were four degree above average for May.

For more information contact your local Soil Conservation Service office.

WALLA WALLA RIVER BASIN
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------- Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
GRANDE RONDE at Troy (1)	JUN-JUL	320	410	450	97	490	580	466
	JUN-SEP	390	500	547	97	595	705	564
SNAKE bl Lower Granite Dam (1,2)	JUN-JUL	4960	6070	6580	68	7090	8200	9678
	JUN-SEP	6380	7790	8430	68	9070	10500	12390
MILL CREEK at Walla Walla	MAY-SEP	4.3	6.2	7.5	100	8.8	10.7	7.5
	MAY-JUL	4.1	6.0	7.3	100	8.6	10.5	7.3
	MAY-JUN	4.1	5.9	7.1	100	8.3	10.1	7.1
SF WALLA WALLA nr Milton Freewater	MAY-JUL	28	32	34	92	36	40	37
COLUMBIA R. at The Dalles (2)	MAY-SEP	53900	60800	65400	76	70000	76900	85560
	MAY-JUL	44800	50500	54400	76	58300	64000	71360
	MAY-JUN	34800	39200	42200	76	45200	49600	55540

WALLA WALLA RIVER BASIN
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg

WALLA WALLA RIVER BASIN
Watershed Snowpack Analysis - June 1, 1993

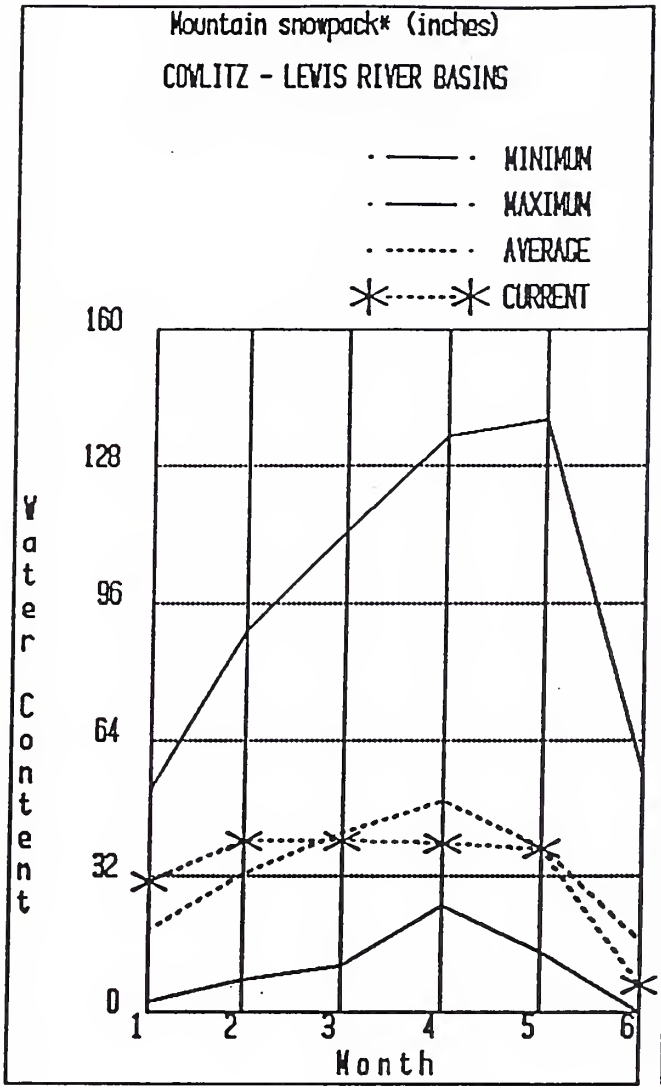
Watershed	Number of Data Sites	This Year as % of Last Yr	Average
Mill Creek	1	0	0

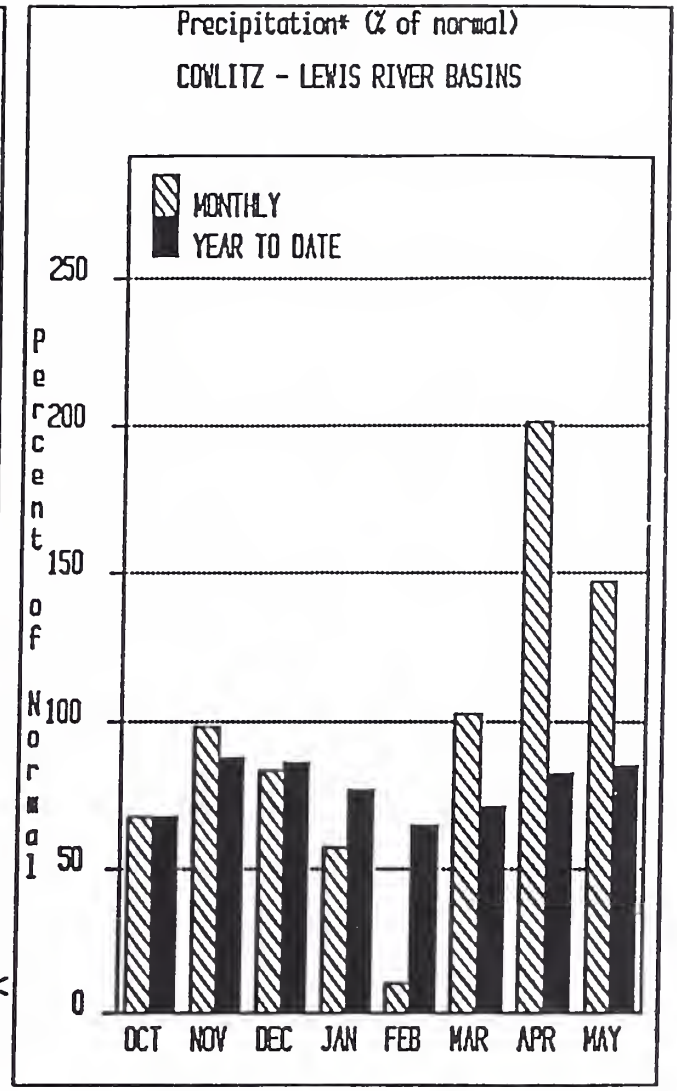
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Cowlitz - Lewis River Basins





*Based on selected stations

The forecast for summer runoff in the Lewis River is 79% and in the Cowlitz River is, 84%. May streamflow on the Cowlitz River was 111% of average, and 204% on the Lewis River. May precipitation was 147% of normal, bringing the water year-to-date precipitation to 85% of average. June 1 snow cover for the Cowlitz River is 40%, and for the Lewis River it is 45%. The Paradise Park SNOTEL contained the maximum water content for the basin with 39.4 inches of water. Normal June 1 water content is 48.1 inches. Temperatures were four degrees above normal for May.

For more information contact your local Soil Conservation Service office.

COWLITZ - LEWIS RIVER BASINS
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------- Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
LEWIS RIVER at Ariel (2)	MAY-SEP	460	585	670	79	755	885	848
	MAY-JUL	385	490	560	80	630	735	696
	MAY-JUN	315	400	460	80	520	605	578
COWLITZ R. bl Mayfield Dam (2)	MAY-SEP	510	975	1290	84	1610	2070	1531
	MAY-JUL	430	820	1085	84	1350	1740	1292
	MAY-JUN	340	655	870	84	1080	1400	1038
COWLITZ R. at Castle Rock (2)	MAY-SEP	785	1380	1780	88	2180	2780	2021
	MAY-JUL	650	1140	1480	88	1820	2310	1679
	MAY-JUN	520	920	1190	88	1460	1860	1349

COWLITZ - LEWIS RIVER BASINS
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg

COWLITZ - LEWIS RIVER BASINS
Watershed Snowpack Analysis - June 1, 1993

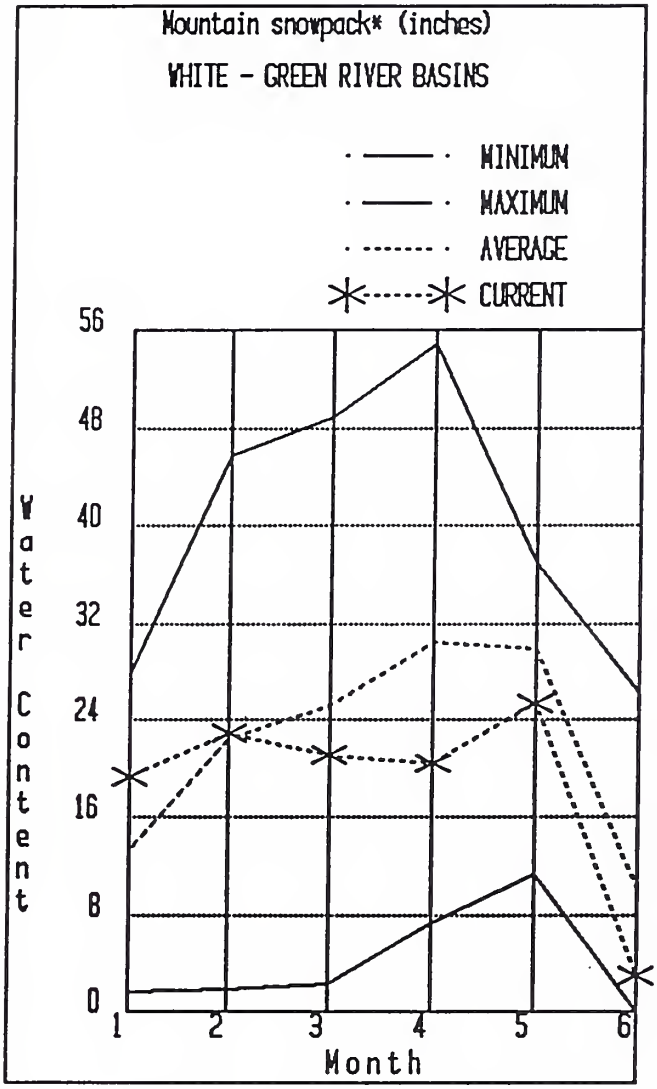
Watershed	Number of Data Sites	This Year as % of Last Yr	Average
Cowlitz River	6	173	40
Lewis River	4	0	45

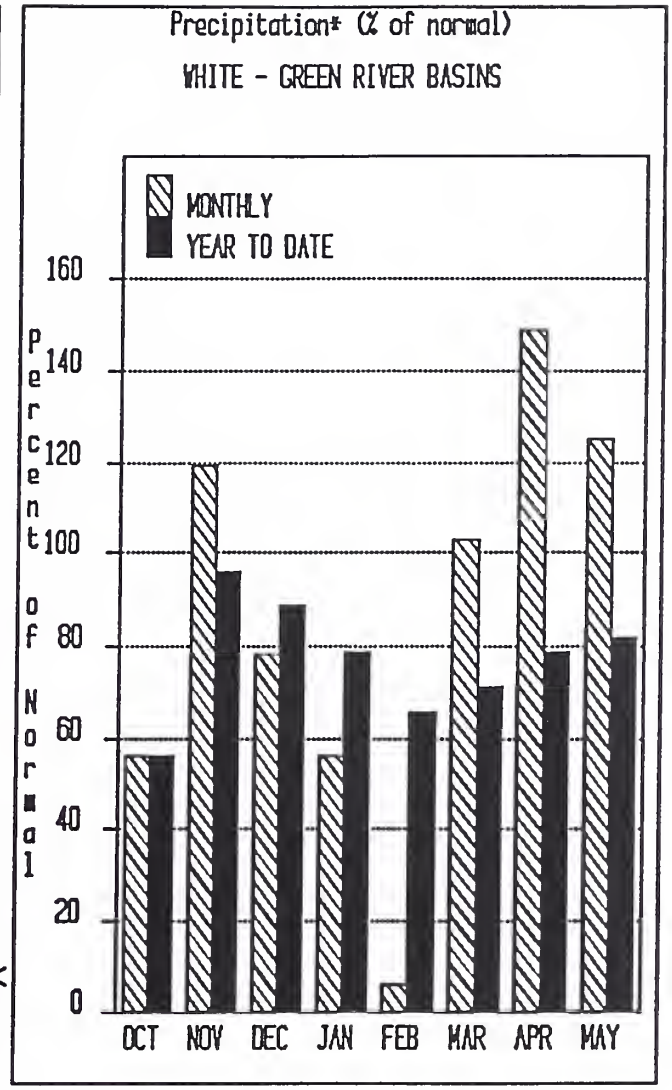
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

White - Green River Basins





*Based on selected stations

June 1 snowpack was 41% of normal in the White River Basin. No snow remained at measuring sites in the Cedar and Green Rivers. May precipitation was 125% of normal, bringing the water-year-to-date to 82% of average. Temperatures were five degree above average for May. Summer runoff is forecasted to be 83% on the Green River and 79% on the Cedar River, the Rex River at 78%, the South Fork of the Tolt River at 81% and the Cedar River at Cedar Falls, 79%. Snowpack melted out at the Stampede Pass SNOTEL, at an elevation of 3860 feet, on May 30. This site has a June 1 average of 15.0 inches.

For more information contact your local Soil Conservation Service office.

WHITE - GREEN RIVER BASINS
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------- Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
GREEN RIVER below Howard Hanson Dam	JUN-JUL	36	53	65	83	77	94	78
	JUN-SEP	57	75	87	82	99	117	106
	JUN-JUN	25	37	46	84	55	68	55
CEDAR RIVER near Cedar Falls	JUN-JUL	14.0	19.0	23	79	27	32	29
	JUN-SEP	19.0	25	29	78	33	39	37
	JUN-JUN	9.2	13.2	16.0	80	18.8	23	20
REX RIVER nr Cedar Falls	JUN-JUL	2.3	5.2	7.2	78	9.2	12.1	9.2
	JUN-SEP	3.4	7.0	9.5	77	12.0	15.6	12.3
	JUN-JUN	1.8	3.9	5.3	78	6.7	8.8	6.8
CEDAR RIVER at Cedar Falls	JUN-JUL	9.0	13.0	17.0	79	20	25	21
	JUN-SEP	12.0	15.0	17.0	78	19.0	22	22
	JUN-JUN	6.9	11.9	15.3	79	18.7	24	19.4
SOUTH FORK TOLT RIVER near Index	JUN-JUL	3.4	4.4	5.1	81	5.8	6.8	6.3
	JUN-SEP	5.3	6.4	7.1	80	7.8	8.9	8.9
	JUN-JUN	2.0	2.8	3.4	81	4.0	4.8	4.2

WHITE - GREEN RIVER BASINS
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg

WHITE - GREEN RIVER BASINS
Watershed Snowpack Analysis - June 1, 1993

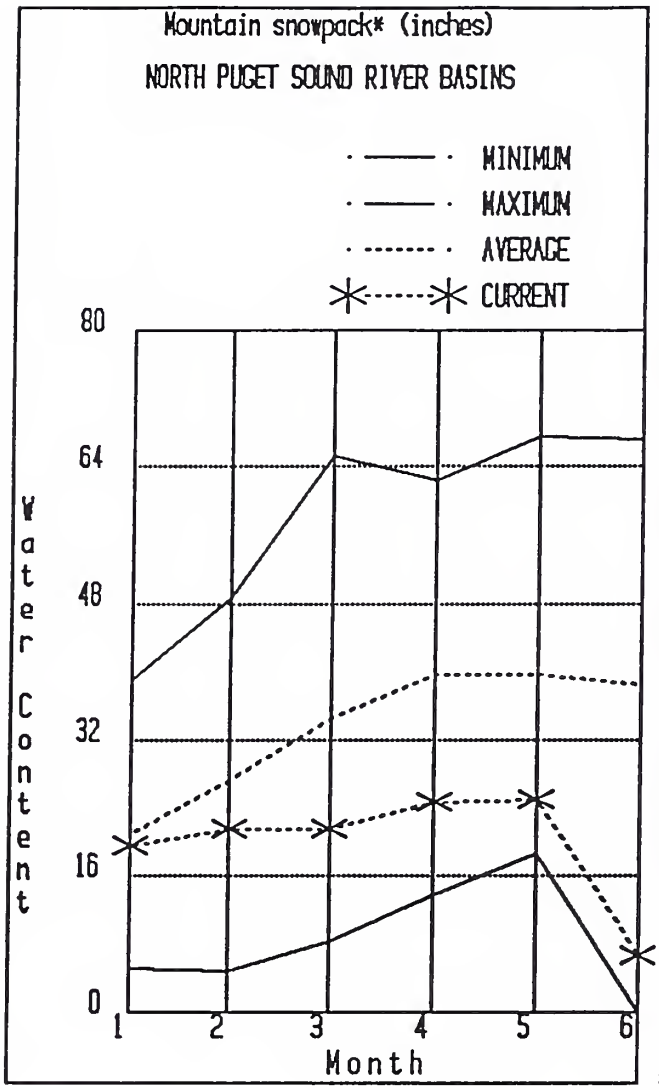
Watershed	Number of Data Sites	This Year as % of Last Yr	Average
White River	2	1120	41
Green River	2	0	0
Cedar River	0	0	0

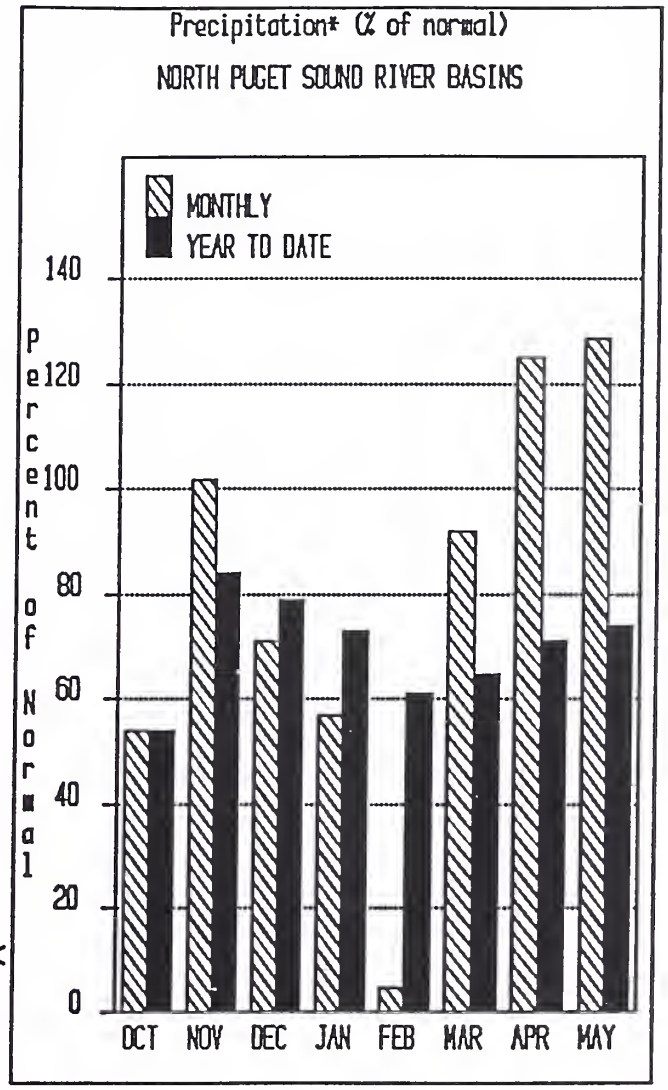
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

North Puget Sound River Basins





*Based on selected stations

Forecast for the Skagit River streamflow is 73% of normal for the spring and summer period. Other forecast points include the Baker River at 76% and Thunder Creek at 77%. May temperatures were four degree above normal. Precipitation for May was 129% of average with a water-year-to-date at 74% of normal. June 1 snow cover in the Skagit River was 32% of normal. May streamflow in the Skagit River was 128% of average. Rainy Pass SNOTEL, at elevation 4780 feet, had no snow remaining having melted out on May 27. Normal June 1 water content is 20.4 inches. June 1 reservoir storage was near average, with Ross Lake Reservoir at 99% of normal and 45% of capacity.

For more information contact your local Soil Conservation Service office.

NORTH PUGET SOUND RIVER BASINS
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------ Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
THUNDER CREEK near Newhalem	JUN-JUL	102	114	123	77	132	144	160
	JUN-SEP	174	190	200	77	210	225	259
	JUN-JUN	44	55	62	78	69	80	80
SKAGIT RIVER at Newhalem (2)	MAY-SEP	1120	1310	1430	73	1550	1740	1963
	MAY-JUL	930	1080	1180	73	1280	1430	1608
	MAY-JUN	660	790	880	74	970	1100	1188
BAKER RIVER near Concrete	JUN-JUL	325	350	370	76	390	415	490
	JUN-SEP	520	535	545	76	555	570	717
	JUN-JUN	123	151	170	76	189	215	225

NORTH PUGET SOUND RIVER BASINS
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg
ROSS		NO REPORT		
DIABLO RESERVOIR		NO REPORT		
GORGE RESERVOIR		NO REPORT		

NORTH PUGET SOUND RIVER BASINS
Watershed Snowpack Analysis - June 1, 1993

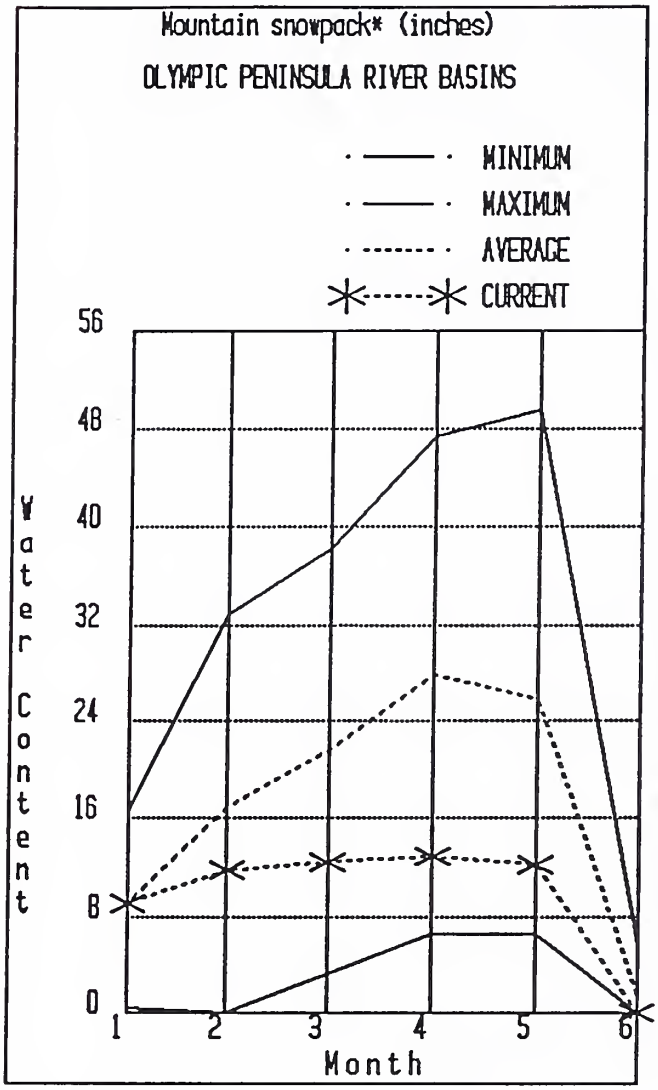
Watershed	Number of Data Sites	This Year as % of Last Yr	Average
Snohomish River	3	0	0
Skagit River	5	71	25
Baker River	0	0	0

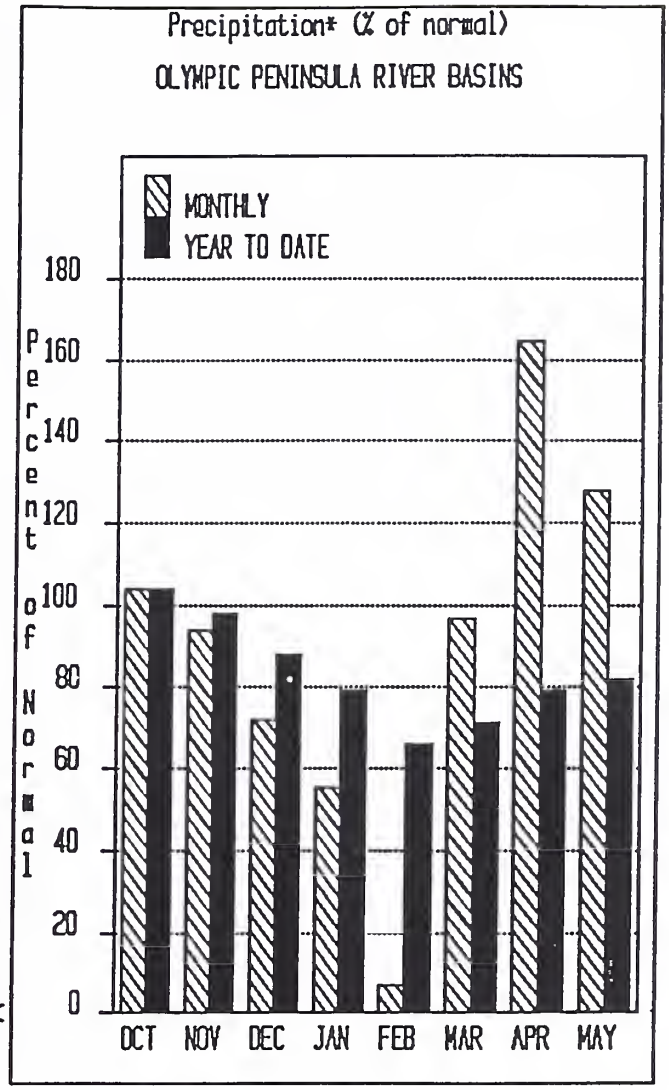
* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Olympic Peninsula River Basins





*Based on selected stations

June runoff forecasts for streamflow in the Olympic Basin are for 72% of average on the Dungeness River and 74% on the Elwha River. The Big Quilcene can expect below normal runoff this summer. May precipitation was 128% of average, with water year-to-date precipitation accumulation at 82% of normal. May precipitation at Quillayute was 12.25 inches, normal for the month is 7.15 inches. June 1 snow cover in the Olympic Basin is gone from the measuring sites. The Mount Crag SNOTEL near Quilcene melted out on May 24. Temperatures were five degrees above normal for May.

For more information contact your local Soil Conservation Service office.

OLYMPIC PENINSULA RIVER BASINS
Streamflow Forecasts - June 1, 1993

Forecast Point	Forecast Period	<<------ Drier ------ Future Conditions ------- Wetter ------>> Chance Of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
DUNGENESS RIVER nr Sequim	MAY-SEP	78	92	101	72	110	124	140
	MAY-JUL	63	74	81	72	88	99	112
	MAY-JUN	41	50	57	72	64	73	79
ELWHA RIVER nr Port Angeles	MAY-SEP	240	285	316	74	345	390	427
	MAY-JUL	190	225	251	73	275	310	342

OLYMPIC PENINSULA RIVER BASINS
Reservoir Storage (1000 AF) - End of May

Reservoir	Usable Capacity	*** Usable Storage *** This Year	Last Year	Avg

OLYMPIC PENINSULA RIVER BASINS
Watershed Snowpack Analysis - June 1, 1993

Watershed	Number of Data Sites	This Year as % of Last Yr	Average
Elwha River	0	0	0
Morse Creek	0	0	0
Dungeness River	0	0	0
Quilcene River	0	0	0
Wynoochee River	0	0	0

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

In addition to basin outlook reports, a Water Supply Forecast for the Western United States is published by the Soil Conservation Service and National Weather Service monthly, January through May. Reports may be obtained from the Soil Conservation Service, West National Technical Center, 511 Northwest Broadway, Room 248, Portland, OR 97209-3489.

Issued by

Galen S. Bridge
Acting Chief
Soil Conservation Service
U.S. Department of Agriculture

Released by

Lynn A. Brown
State Conservationist
Soil Conservation Service
Spokane, Washington

The Following Organizations Cooperate With The Soil Conservation Service In Snow Survey Work

Canada:
Ministry of the Environment, Water Management Division
Victoria, British Columbia

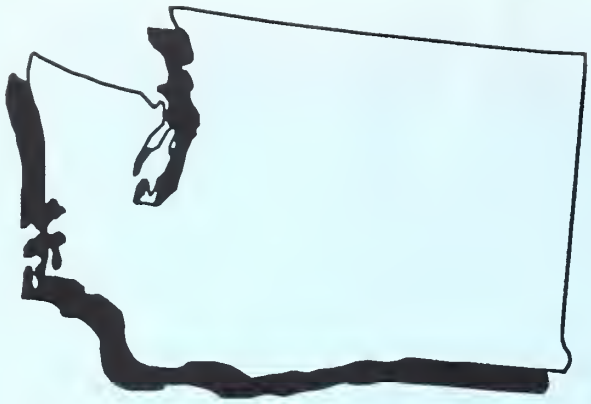
States:
Washington State Department of Natural Resources

Federal:
Department of the Army
Corps of Engineers
U.S. Department of Agriculture
Forest Service
U.S. Department of Commerce
NOAA, National Weather Service
U.S. Department of the Interior
Bureau of Reclamation
National Park Service

Local:
City of Tacoma
City of Seattle
Chelan Co unty P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company
Snohomish County P.U.D.
Colville Confederated Tribes
Spokane County
Yakima Indian Nation

Private:
Okanogan Irrigation District
Newman Lake Homeowners Association

Other organizations and individuals fumish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.



Rock Pointe Tower II, Suite 450
W. 316 Boone Avenue
Spokane, WA 99201-2349

A
U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICUL. LIBRARY
CURRENT SERIAL RECORDS
BELTSVILLE MD 20705

SOIL CONSERVATION SERVICE

Washington Basin Outlook Report

Soil Conservation Service
Spokane, WA